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be cleaner than an equilibrium condition such that artificially low emission measurements may result.

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§ 1065.518 Engine preconditioning.

(a) This section applies for engines where measured emissions are affected by prior operation, such as with a diesel engine that relies on urea-based selective catalytic reduction. Note that § 1065.520(e) allows you to run practice duty cycles before the emission test; this section recommends how to do this for the purpose of preconditioning the engine. Follow the standard-setting part if it specifies a different engine preconditioning procedure.

(b) The intent of engine preconditioning is to manage the representativeness of emissions and emission controls over the duty cycle and to reduce bias.

(c) This paragraph (c) specifies the engine preconditioning procedures for different types of duty cycles. You must identify the amount of preconditioning before starting to precondition. You must run the predefined amount of preconditioning. You may measure emissions during preconditioning. You may not abort an emission test sequence based on emissions measured during preconditioning. For confirmatory testing, you may ask us to run more preconditioning cycles than we specify in this paragraph (c); we will agree to this only if you show that additional preconditioning cycles are required to meet the intent of paragraph (b) of this section, for example, due to the effect of DPF regeneration on NH_3 storage in the SCR catalyst. Perform preconditioning as follows, noting that the specific cycles for preconditioning are the same ones that apply for emission testing:

(1) *Cold-start transient cycle.* Precondition the engine by running at least one hot-start transient cycle. We will precondition your engine by running two hot-start transient cycles. Immediately after completing each preconditioning cycle, shut down the engine and complete the engine-off soak period. Immediately after completing the last preconditioning cycle, shut down the engine and begin the cold soak as described in § 1065.530(a)(1).

(2) *Hot-start transient cycle.* Precondition the engine by running at least one hot-start transient cycle. We will precondition your engine by running two hot-start transient cycles. Immediately after completing each preconditioning cycle, shut down the engine, then start the next cycle (including the emission test) as soon as practical. For any repeat cycles, start the next cycle within 60 seconds after completing the last preconditioning cycle (this is optional for manufacturer testing).

(3) *Hot-running transient cycle.* Precondition the engine by running at least one hot-running transient cycle. We will precondition your engine by running two hot-running transient cycles. Do not shut down the engine between cycles. Immediately after completing each preconditioning cycle, start the next cycle (including the emission test) as soon as practical. For any repeat cycles, start the next cycle within 60 seconds after completing the last preconditioning cycle (this is optional for manufacturer testing). See § 1065.530(a)(1)(iii) for additional instructions if the cycle begins and ends under different operating conditions.

(4) *Discrete-mode cycle for steady-state testing.* Precondition the engine at the same operating condition as the next test mode, unless the standard-setting part specifies otherwise. We will precondition your engine by running it for at least five minutes before sampling.

(5) *Ramped-modal cycle for steady-state testing.* Precondition the engine by running at least the second half of the ramped-modal cycle, based on the number of test modes. For example, for the five-mode cycle specified in 40 CFR 1039.505(b)(1), the second half of the cycle consists of modes three through five. We will precondition your engine by running one complete ramped-modal cycle. Do not shut down the engine between cycles. Immediately after completing each preconditioning cycle, start the next cycle (including the emission test) as soon as practical. For any repeat cycles, start the next cycle within 60 seconds after completing the last preconditioning cycle. See § 1065.530(a)(1)(iii) for additional instructions if the cycle begins and ends under different operating conditions.

(d) You may conduct calibrations or verifications on any idle equipment or analyzers during engine preconditioning.

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§ 1065.520 Pre-test verification procedures and pre-test data collection.

(a) For tests in which you measure PM emissions, follow the procedures for PM sample preconditioning and tare weighing according to § 1065.590.

(b) Unless the standard-setting part specifies different tolerances, verify at some point before the test that ambient conditions are within the tolerances specified in this paragraph (b). For purposes of this paragraph (b), ''before the test'' means any time from a point just prior to engine starting (excluding engine restarts) to the point at which emission sampling begins.

(1) Ambient temperature of (20 to 30) °C. See § 1065.530(j) for circumstances under which ambient temperatures must remain within this range during the test.

(2) Atmospheric pressure of (80.000 to 103.325) kPa and within ±5 kPa of the value recorded at the time of the last engine map. You are not required to verify atmospheric pressure prior to a hot start test interval for testing that also includes a cold start.

(3) Dilution air conditions as specified in § 1065.140, except in cases where you preheat your CVS before a cold start test. We recommend verifying dilution air conditions just prior to the start of each test interval.

(c) You may test engines at any intake-air humidity, and we may test engines at any intake-air humidity.

(d) Verify that auxiliary-work inputs and outputs are configured as they were during engine mapping, as described in § 1065.510(a).

(e) You may perform a final calibration of the speed, torque, and proportional-flow control systems, which may include performing practice duty cycles (or portions of duty cycles). This may be done in conjunction with the preconditioning in § 1065.518.

(f) Verify the amount of nonmethane hydrocarbon contamination in the exhaust and background HC sampling systems within 8 hours before the start of the first test interval of each duty-cycle sequence for laboratory tests. You may verify the contamination of a background HC sampling system by reading the last bag fill and purge using zero gas. For any NMHC measurement system that involves separately measuring CH_4 and subtracting it from a THC measurement or for any CH_4 measurement system that uses an NMC, verify the amount of THC contamination using only the THC analyzer response. There is no need to operate any separate CH_4 analyzer for this verification; however, you may measure and correct for THC contamination in the CH_4 sample path for the cases where NMHC is determined by subtracting CH_4 from THC or, where CH_4 is determined, using an NMC as configured in § 1065.365(d), (e), and (f); and using the calculations in § 1065.660(b)(2). Perform this verification as follows:

(1) Select the HC analyzer range for measuring the flow-weighted mean concentration expected at the HC standard.

(2) Zero the HC analyzer at the analyzer zero or sample port. Note that FID zero and span balance gases may be any combination of purified air or purified nitrogen that meets the specifications of § 1065.750. We recommend FID analyzer zero and span gases that contain approximately the flow-weighted mean concentration of O_2 expected during testing.

(3) Span the HC analyzer using span gas introduced at the analyzer span or sample port. Span on a carbon number basis of one (C_1). For example, if you use a C_3H_8 span gas of concentration 200 μmol/mol, span the FID to respond with a value of 600 μmol/mol.

(4) Overflow zero gas at the HC probe inlet or into a tee near the probe outlet.

(5) Measure the THC concentration in the sampling and background systems as follows:

(i) For continuous sampling, record the mean THC concentration as overflow zero gas flows.

(ii) For batch sampling, fill the sample medium (e.g., bag) and record its mean THC concentration.

(iii) For the background system, record the mean THC concentration of the last fill and purge.